Complement pathways in a nutshell

There are three different types of complement pathways.

Here are the details of each one:

1: Classical pathway

- In this pathway, complement components C1, C2 and C4 are the key players.
- The pathway is activated by antibody-antigen complexes binding to C1 (which has 3 subcomponents C1q, C1r and C1s).
- Then a C3 convertase, C4b2a is generated and breaks up C3 into 2 fragments.
- The larger fragment, C3b, can bind to the surface of microorganisms and neutralise (opsonise) them.
- The smaller fragment, C3a, triggers mast cells to produce inflammatory mediators such as histamine.

2: Alternative pathway

- In this pathway various factors, B, D, H & I, associate with each other, and with C3b, to form a C3 convertase, C3bBb.
- This can trigger more C3, therefore being capable of autoactivation (via so called "tickover" of C3 or ‘the amplification loop’).
- Triggering of the loop occurs in response to bacterial and fungal cell walls, and is halted by self-molecules on the surface of healthy cells.

3: Mannose-binding lectin pathway

- The activation of this pathway occurs on binding of mannose-binding lectin (MBL) to mannose residues on the surface of a microorganism.
- As a result, the MBL-associated serine proteases (MASP-1 and MASP-2) are triggered and activate C2 and C4, to generate the C3 convertase (C4b2a).